CLAIMS

What is claimed is:

1. An immersion lithography method, comprising:

providing a base developer as an immersion lithography fluid so as to contact a projection lens and a resist, the resist positioned over a semiconductor structure;

irradiating portions of the resist through the projection lens and the immersion lithography fluid; and

removing the immersion lithography fluid and irradiated portions of the resist to provide a patterned resist on the semiconductor structure, with the proviso that a developer is not contacted with the irradiated resist after the immersion lithography fluid is removed.

2. The immersion lithography method according to claim 1, the base developer selected from the group consisting of sodium hydroxide, potassium hydroxide, calcium hydroxide, ammonium hydroxide, tetramethylammonium hydroxide, tetraethylammonium hydroxide, dimethyldiethylammonium hydroxide, sodium bicarbonate, tetramethylammonium bicarbonate, disodium carbonate, tetrapropylammonium hydroxide, trimethylethylammonium hydroxide, (2-hydroxyethyl)trimethylammonium hydroxide, (2-hydroxyethyl)triethylammonium hydroxide, (2-hydroxyethyl)tripropylammonium hydroxide, (1-hydroxypropyl)trimethylammonium hydroxide, 2-hydroxyl trimethyl ammonium hydroxide, lithium borate, sodium borate, sodium hydrogen-phosphate, ammonium dihydrogen-phosphate, sodium dihydrogen-phosphate, potassium dihydrogen-phosphate, lithium phosphate, lithium silicate, potassium silicate, sodium silicate, monomethylamine, dimethylamine, trimethylamine, diethylamine, triethylamine, monoiso-pyruamine, di-isopyruamine, n-propylamine, n-butylamine and 1,3-diaminopropane, di-n-propylamine, di-n-butylamine, 4,4'-diaminodiphenylamine, n,n-dimethylethylamine, n,n-diethylmethylamine,

triethylamine, bis(dialkylamino)imines, monoethanolamine, diethanolamine, triethanolamine, diethylethanolamine, and propanolaminec.

3. The immersion lithography method according to claim 1, the base developer comprising tetraalkyammonium hydroxide.

4. The immersion lithography method according to claim 1, the resist comprising a negative tone resist.

5. The immersion lithography method according to claim 1, the resist comprising a positive tone resist.

6. The immersion lithography method according to claim 1, the resist irradiated with light having a wavelength of about 450 nm or less.

7. The immersion lithography method according to claim 1, the projection lens positioned about 2,500 μm or less away from the resist through the immersion lithography fluid.

8. The immersion lithography method according to claim 1, the immersion lithography fluid is removed from about 2 seconds to about 200 minutes after irradiation.

9. The immersion lithography method according to claim 1, further comprising rinsing the patterned resist on the semiconductor structure with deionized water.

10. An immersion lithography method, comprising:

providing a base developer as an immersion lithography fluid so as to contact a projection lens and a resist, the resist positioned on a bottom antireflective coating, the bottom antireflective coating positioned on a semiconductor structure;

irradiating portions of the resist through the projection lens and the immersion lithography fluid; and

removing the immersion lithography fluid, irradiated portions of the resist, and portions of the bottom antireflective coating underlying the irradiated portions of the resist to provide a patterned resist and a correspondingly patterned bottom antireflective coating on the semiconductor structure, with the proviso that a developer is not contacted with the irradiated resist after the immersion lithography fluid is removed.

11. The immersion lithography method according to claim 10, the base developer selected from the group consisting of organic amines, alkali metal hydroxides, alkaline earth metal hydroxides, ammonium hydroxides, tetraalkylammonium hydroxides, alkali metal carbonates and bicarbonates, alkaline earth metal carbonates and bicarbonates, ammonium carbonates and bicarbonates, tetraalkylammonium carbonates and bicarbonates, alkali metal borates, ammonium borates, tetratalkylammonium borates, alkali metal dihydrogen-phosphates, alkaline earth metal dihydrogen-phosphates, ammonium dihydrogen-phosphates, tetraalkylammonium dihydrogen-phosphates, alkali metal silicates, alkaline earth metal silicates, ammonium silicates, and tetraalkylammonium silicates.

12. The immersion lithography method according to claim 10, the bottom antireflective coating comprising dye and a developer soluble film forming material.

13. The immersion lithography method according to claim 10, the immersion lithography fluid having a temperature from about 10 °C. to about 99 °C.

14. The immersion lithography method according to claim 10, the resist is irradiated with radiation having a wavelength selected from the group consisting of about 436 nm light, about 365 nm light, about 248 nm light, about 193 nm light, about 157 nm light, about 13 nm light, about 11 nm light, X-rays, and e-beams.

15. The immersion lithography method according to claim 10, the immersion lithography fluid having a pH greater than about 10.

16. An immersion lithography method, comprising:

providing a base developer as an immersion lithography fluid so as to contact a projection lens and a resist, the resist positioned over a semiconductor structure, the immersion lithography fluid comprising a solvent and from about 0.01% to about 20% by weight of at least a base compound;

irradiating portions of the resist through the projection lens and the immersion lithography fluid; and

removing the immersion lithography fluid and irradiated portions of the resist to provide a patterned resist on the semiconductor structure, with the proviso that a developer is not contacted with the irradiated resist after the immersion lithography fluid is removed.

17. The immersion lithography method according to claim 16, the resist positioned on a bottom antireflective coating, the bottom antireflective coating positioned on a semiconductor structure.

18. The immersion lithography method according to claim 16, the base developer selected from the group consisting of organic amines, alkali metal hydroxides, alkaline earth metal hydroxides, ammonium hydroxides, tetraalkylammonium hydroxides, alkali metal carbonates and bicarbonates, alkaline earth metal carbonates and bicarbonates, ammonium carbonates and bicarbonates, tetraalkylammonium carbonates and bicarbonates, alkali metal borates, ammonium

borates, tetratalkylammonium borates, alkali metal dihydrogen-phosphates, alkaline earth metal dihydrogen-phosphates, ammonium dihydrogen-phosphates, tetraalkylammonium dihydrogen-phosphates, alkali metal silicates, alkaline earth metal silicates, ammonium silicates, and tetraalkylammonium silicates.

19. The immersion lithography method according to claim 16, the resist irradiated with light having a wavelength of about 250 nm or less.

20. The immersion lithography method according to claim 16, the immersion lithography fluid is removed from about 15 seconds to about 50 minutes after irradiation.